# Axpert KS Inverter

- Pure sine wave inverter
- Selectable input voltage range for home appliances and personal computers
- Selectable charging current based on applications
- Configurable AC/Solar input priority via LCD setting
- Compatible to mains voltage or generator power
- Parallel operation with up to 4 units only available for Axpert KS 5KVA*
- Auto restart while AC is recovering
- Overload and short circuit protection
- Smart battery charger design for optimized battery performance
- Cold start function



## Axpert KS Inverter Selection Guide

| MODEL | Axpert KS 1K | Axpert KS 2K | Axpert KS 3K | Axpert KS 4K | Axpert KS 5K |
|---|---|---|---|---|---|
| Rated Power | 1000VA / 800W | 2000VA/1600W | 3000VA / 2400W | 4000VA / 3200W | 5000VA / 4000W |
| **INPUT** | | | | | |
| Voltage | 230 VAC | | | | |
| Selectable Voltage Range | 170-280 VAC (For Personal Computers)<br>90-280 VAC (For Home Appliances) | | | | |
| Frequency Range | 50 Hz/60 Hz (Auto sensing) | | | | |
| **OUTPUT** | | | | | |
| AC Voltage Regulation (Batt. Mode) | 230VAC ± 5 % | | | | |
| Surge Power | 2000VA | 4000VA | 6000VA | 8000VA | 10000VA |
| Efficiency (Peak) | 90% | 93% | | | |
| Transfer Time | 10 ms (For Personal Computers)<br>20 ms (For Home Appliances) | | | | |
| Waveform | Pure sine wave | | | | |
| **BATTERY** | | | | | |
| Battery Voltage | 12 VDC | 24 VDC | | 48 VDC | |
| Floating Charge Voltage | 13.5 VDC | 27 VDC | | 54 VDC | |
| Overcharge Protection | 15 VDC | 30 VDC | | 60 VDC | |
| Maximum Charge Current | 10 A or 20 A | 20 A or 30 A | | 20 A or 30 A | |
| **SOLAR CHARGER (OPTION)** | | | | | |
| Charging Current | 50A | | | | |
| Maximum PV Array Open Circuit Voltage | 125 VDC | | | | |
| Standby Power Consumption | 1 W | 2 W | | 2W | |
| **PHYSICAL** | | | | | |
| Dimension, D x W x H (mm) | 95 x 240 x 316 | 100 x 272 x 355 | | 115 x 295 x 455 | |
| Net Weight (kgs) | 5.0 | 6.4 | 6.9 | 9.8 | 9.8 |
| **OPERATING ENVIRONMENT** | | | | | |
| Humidity | 5% to 95% Relative Humidity(Non-condensing) | | | | |
| Operating Temperature | 0°C - 55°C | | | | |
| Storage Temperature | -15°C - 60°C | | | | |

*Typical transfer time for parallel operation is 30ms.
Product specifications are subject to change without further notice

# User Manual

# 4KVA/ 5KVA
# INVERTER / CHARGER

# CONTENTS


**ABOUT THIS MANUAL ..... 1**

Purpose ..... 1
Scope ..... 1

**SAFETY INSTRUCTIONS ..... 1**

**INTRODUCTION ..... 2**

Features ..... 2
Basic System Architecture ..... 2
Product Overview ..... 3
Operation Diagrams and work conditions ..... 4

**INSTALLATION ..... 7**

Unpacking and Inspection ..... 7
Preparation ..... 7
Mounting the Unit ..... 7
Battery Connection ..... 8
AC Input/Output Connection ..... 9
PV Connection (Only apply for the model with solar charger) ..... 10
Final Assembly ..... 11

**OPERATION ..... 12**

Power ON/OFF ..... 12
Operation and Display Panel ..... 12
LCD Display Icons ..... 13
LCD Setting ..... 15
Display Setting ..... 16
Operating Mode Description ..... 18
Fault Reference Code ..... 19
Warning Indicator ..... 20

**SPECIFICATIONS ..... 21**

Table 1 Line Mode Specifications ..... 21
Table 2 Invert Mode Specifications ..... 22
Table 3 Charge Mode Specifications ..... 23
Table 4 General Specifications ..... 23
Charging Controls ..... 23

**TROUBLE SHOOTING ..... 24**

**Appendix: Approximate Back-up Time Table ..... 25**

# ABOUT THIS MANUAL

## Purpose

This manual describes the assembly, installation, operation and troubleshooting of this unit. Please read this manual carefully before installations and operations. Keep this manual for future reference.

## Scope

This manual provides safety and installation guidelines as well as information on tools and wiring.

# SAFETY INSTRUCTIONS

**WARNING: This chapter contains important safety and operating instructions. Read and keep this manual for future reference.**

1. Before using the unit, read all instructions and cautionary markings on the unit, the batteries and all appropriate sections of this manual.
2. **CAUTION** --To reduce risk of injury, charge only deep-cycle lead acid type rechargeable batteries. Other types of batteries may burst, causing personal injury and damage.
3. Do not disassemble the unit. Take it to a qualified service center when service or repair is required. Incorrect re-assembly may result in a risk of electric shock or fire.
4. To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
5. **CAUTION** – Only qualified personnel can install this device with battery.
6. **NEVER** charge a frozen battery.
7. For optimum operation of this inverter/charger, please follow required spec to select appropriate cable size. It's very important to correctly operate this inverter/charger.
8. Be very cautious when working with metal tools on or around batteries. A potential risk exists to drop a tool to spark or short circuit batteries or other electrical parts and could cause an explosion.
9. Please strictly follow installation procedure when you want to disconnect AC or DC terminals. Please refer to INSTALLATION section of this manual for the details.
10. Fuses (4 pieces of 30A, 150VDC for 4KVA and 5pcs of that for 5KVA) are provided as over-current protection for the battery supply.
11. GROUNDING INSTRUCTIONS -This inverter/charger should be connected to a permanent grounded wiring system. Be sure to comply with local requirements and regulation to install this inverter.
12. NEVER cause AC output and DC input short circuited. Do NOT connect to the mains when DC input short circuits.
13. **Warning!!** Only qualified service persons are able to service this device. If errors still persist after following troubleshooting table, please send this inverter/charger back to local dealer or service center for maintenance.

# INTRODUCTION

This is a multi-function inverter/charger, combining functions of inverter, solar charger and battery charger to offer uninterruptible power support with portable size. Its comprehensive LCD display offers user-configurable and easy-accessible button operation such as battery charging current, AC/solar charger priority, and acceptable input voltage based on different applications.

## Features

- Pure sine wave inverter
- Configurable input voltage range for home appliances and personal computers via LCD setting
- Configurable battery charging current based on applications via LCD setting
- Configurable AC/Solar Charger priority via LCD setting
- Compatible to mains voltage or generator power
- Auto restart while AC is recovering
- Overload/ Over temperature/ short circuit protection
- Smart battery charger design for optimized battery performance
- Cold start function

## Basic System Architecture

The following illustration shows basic application for this inverter/charger. It also includes following devices to have a complete running system:

- Generator or Utility.
- PV modules (option)

Consult with your system integrator for other possible system architectures depending on your requirements.

This inverter can power all kinds of appliances in home or office environment, including motor-type appliances such as tube light, fan, refrigerator and air conditioner.

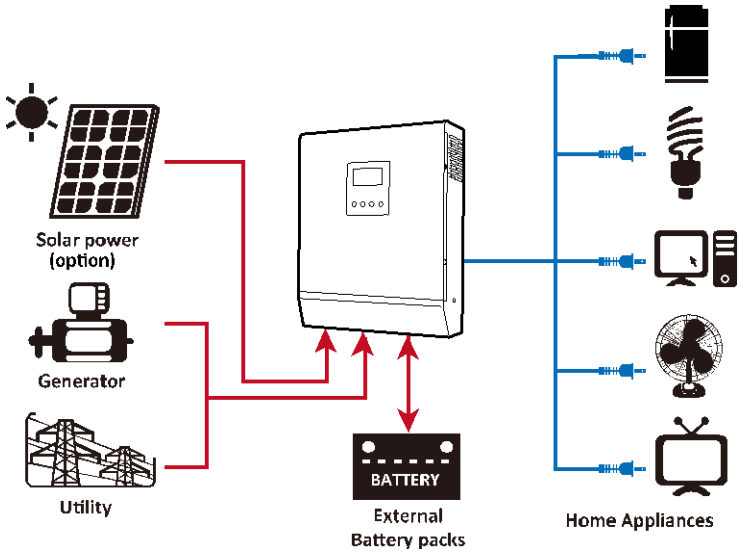
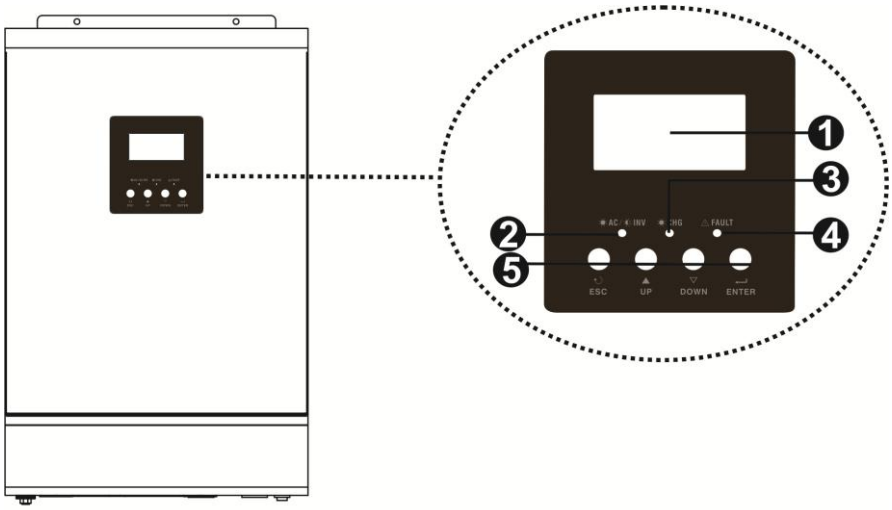
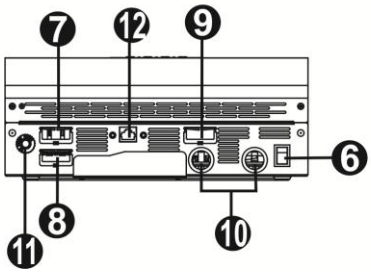



Figure 1 Hybrid Power System

**Note:** Appliances such as air conditioner are required at least 2~3 minutes to restart because it's required to have enough time to balance refrigerant gas inside of circuits. If a power shortage occurs and recovers in a short time, it will cause damage to your connected appliances. To prevent this kind of damage, please check manufacturer of air conditioner if it's equipped with time-delay function before installation. Otherwise, this inverter/charger will trig overload fault and cut off output to protect your appliance but sometimes it still causes internal damage to the air conditioner.

## Product Overview




1. LCD display
2. Status indicator
3. Charging indicator
4. Fault indicator
5. Function buttons
6. Power on/off switch
7. AC input
8. AC output
9. PV input
10. Battery input
11. Circuit breaker
12. RS-232 communication port

# Operation Diagrams and Working Conditions

Abbreviation:

**$I_{UC}$**, charging current from AC charger

**$I_{SC}$**, charger current from solar charger

**$I_{CHG}$**, total charging current of battery

**$I_{DISC}$**, discharging current from battery

**$I_{LOAD}$**, output current of AC load

**CSF**, Solar Charge First

**CUF**, Utility Charge First

**CS+UF**, Solar & Utility Charge at the same time

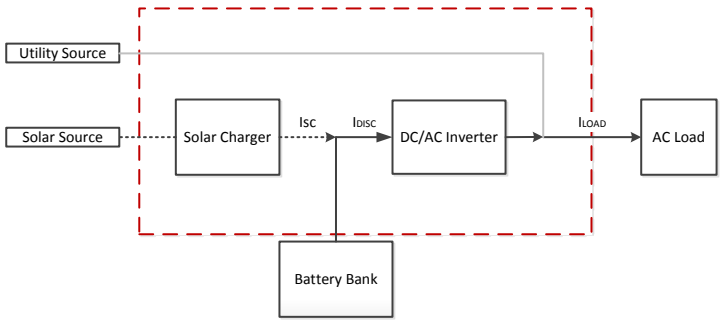
**OSF**, Output Solar First

**OUF**, Output Utility First

The device working status is determined by the states of inputs, the power on/off status, charging priority and output priority setting. Please refer to the following table for the device's work state.

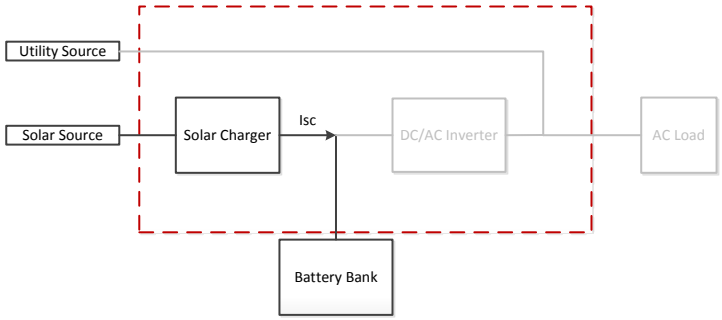
| Solar | Utility | Battery | Power on/off Switch | Output Priority | Charge Priority | State |
|---|---|---|---|---|---|---|
| -- | LOSS | OK | ON | -- | -- | BAT AC OUTPUT |
| OK | LOSS | LOW | -- | -- | -- | SOLAR CHARGE WITHOUT OUTPUT |
| OK | LOSS | OK | OFF | -- | -- | SOLAR CHARGE WITHOUT OUTPUT |
| LOSS | OK | -- | -- | -- | CUF,CS+UF | AC CHARGE |
| LOSS | OK | -- | -- | -- | CSF | NO CHARGE |
| OK | OK | LOW | -- | -- | CUF | AC CHARGE |
| OK | OK | LOW | ON | -- | CSF | SOLAR CHARGE WITH OUTPUT |
| OK | OK | LOW | OFF | -- | CSF | SOLAR CHARGE WITHOUT OUTPUT |
| OK | OK | LOW | -- | -- | CS+UF | AC & SOLAR CHARGE |
| OK | OK | OK | OFF | OSF | CSF | SOLAR CHARGE WITHOUT OUTPUT |
| OK | OK | OK | OFF | OSF | CUF | AC CHARGE |
| OK | OK | OK | OFF | OSF | CS+UF | AC & SOLAR CHARGE |
| OK | OK | OK | ON | OSF | -- | BAT MODE |
| OK | OK | OK | -- | OUF | CUF | AC CHARGE |
| OK | OK | OK | ON | OUF | CSF | SOLAR CHARGE WITH OUTPUT |
| OK | OK | OK | OFF | OUF | CSF | SOLAR CHARGE WITHOUT OUTPUT |
| OK | OK | OK | -- | OUF | CS+UF | AC & SOLAR CHARGE |

1) BAT AC OUTPUT



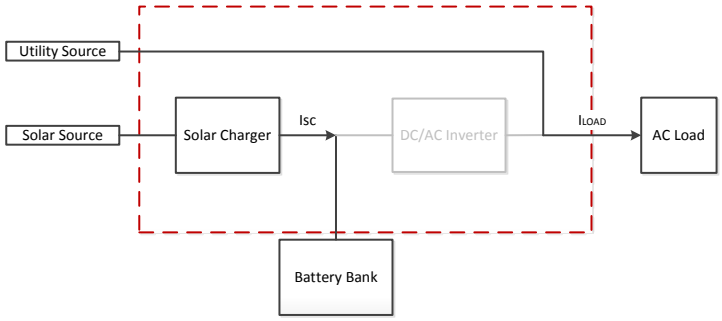
The load is powered by battery power and solar power. Solar charger works when solar power is OK. The maximum $I_{SC}$ will go up to 50Amp. Then, the status of solar power and connected load will determine if battery is charge or discharge.

2) SOLAR CHARGE WITHOUT OUTPUT



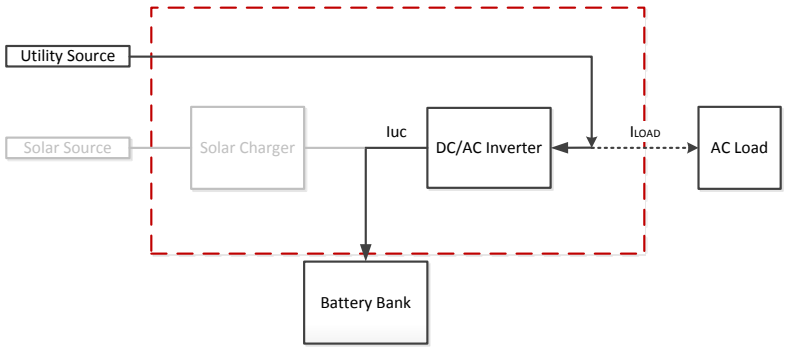

Solar charges the battery. The Max. $I_{SC}$ goes up to 50Amp if solar panel with enough energy. No load is powered at this state.

3) SOLAR CHARGE WITH OUTPUT



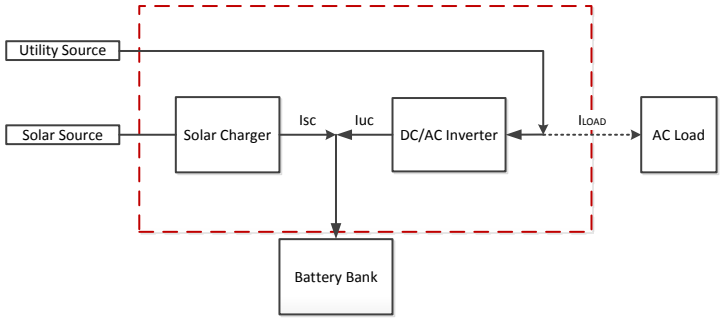

The load is powered by the utility. Solar power charges the battery. The maximum $I_{SC}$ will go up to 50Amp if enough energy is generated by solar modules.

4) AC CHARGE



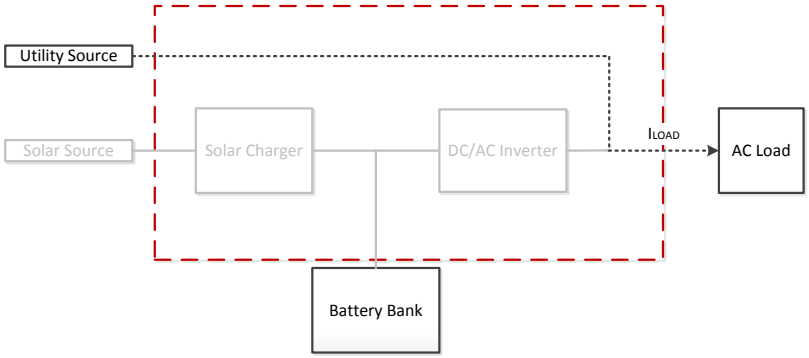

The battery is charged by the utility. The maximum $I_{UC}$ is 30Amp. The solar charger doesn't work. When the power ON/OFF switch is turned "ON", the device will generate output to the load. When the power ON/OFF switch is turned "OFF", the device won't generate output to the load.

5) AC & SOLAR CHARGE




The battery is charged by the utility and solar power at the same time. $I_{CHG} = I_{UC} + I_{SC}$ and the maximum $I_{CHG}$ is 50Amp. When the power ON/OFF switch is turned "ON', the device will generate output to the load. If the power ON/OFF switch is turned "OFF", the device won't generate output to the load.

6) NO CHARGE




When the power ON/OFF switch is turned "ON", the device will generate output to the load. If the power ON/OFF switch is turned "OFF", the device won't generate output to the load. There is no charging current to the battery.

# INSTALLATION

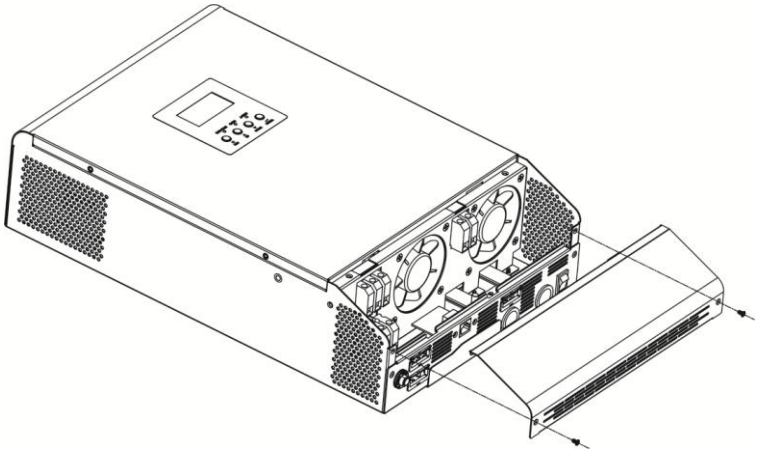
## Unpacking and Inspection

Before installation, please inspect the unit. Be sure that nothing inside the package is damaged. You should have received the following items inside of package:

- The unit x 1
- User manual x 1
- Communication cable x 1

## Preparation

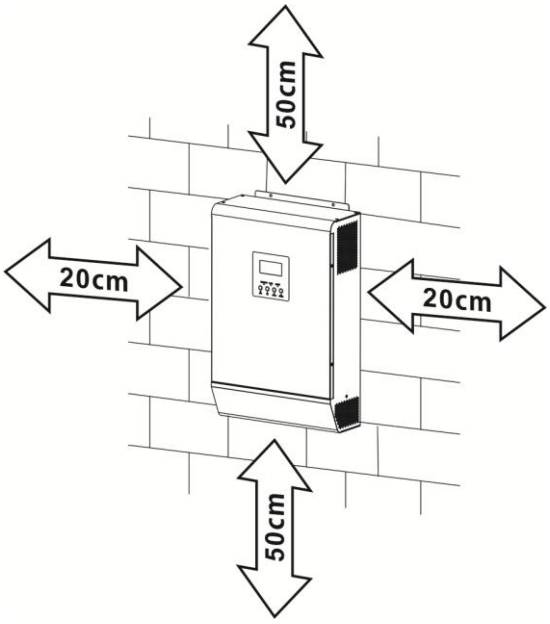
Before connecting all wirings, please take off bottom cover by removing two screws as shown below.



## Mounting the Unit

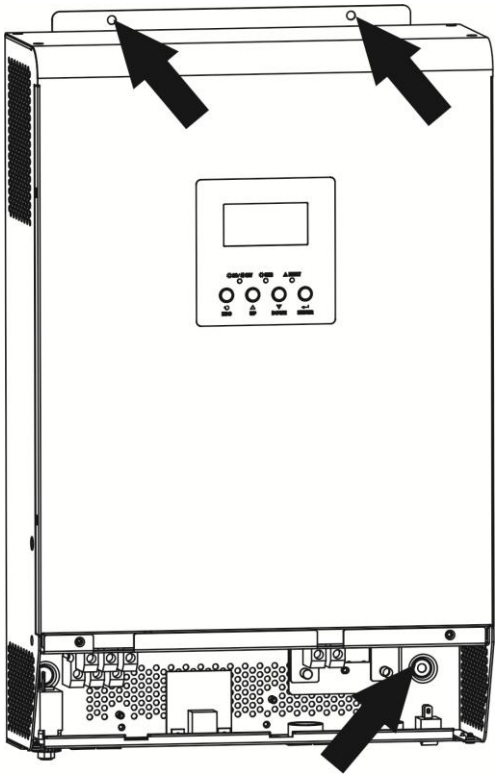
Consider the following points before selecting where to install:

- Do not mount the inverter on flammable construction materials.
- Mount on a solid surface
- Install this inverter at eye level in order to allow the LCD display to be read at all times.
- For proper air circulation to dissipate heat, allow a clearance of approx. 10 cm to the side and approx. 50 cm above and below the unit.
- The ambient temperature should be between 0°C and 55°C to ensure optimal operation.
- The recommended installation position is to be adhered to the wall vertically.
- Be sure keep other objects and surfaces as shown in the below diagram to guarantee sufficient heat dissipation and to have enough space for removing wires.




**SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY.**

Install the unit by screwing three screws.



## Battery Connection

**CAUTION:** To safety operation and regulation compliance, it's requested to install a separate DC over-current protector or disconnect device between battery and inverter. It may not be requested to have a disconnect device in some applications, however, it's still requested to have over-current protection installed. Please refer to typical amperage in below table as required fuse or beaker size.

**WARNING!** All wiring must be performed by a qualified personnel.
**WARNING!** It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable and terminal size as below.
**Recommended battery cable and terminal size:**

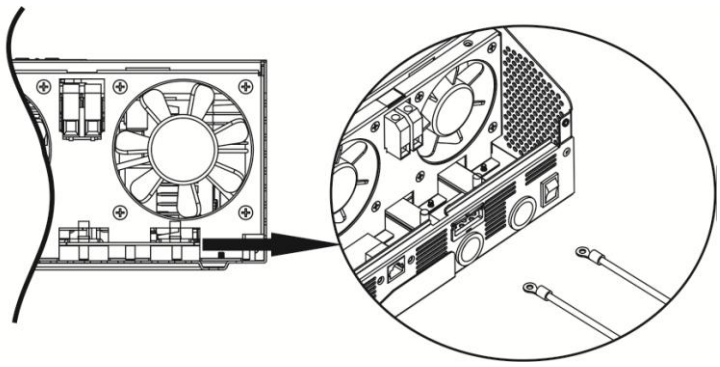
| Model | Typical Amperage | Battery capacity | 1~3 m one-way | Ring Type for Cable Terminal | Torque value |
|---|---|---|---|---|---|
| 4KVA | 67A | 200AH | 1*4AWG | KST: RNBS22-6 | 2~ 3 Nm |
| | | | 2*8AWG | KST: RNBS14-6 | |
| 5KVA | 84A | 200AH | 1*4AWG | KST: RNBS22-6 | 2~ 3 Nm |
| | | | 2*8AWG | KST: RNBS14-6 | |

Please follow below steps to implement battery connection:

1. Assemble battery ring terminal based on recommended battery cable and terminal size.
2. This model supports 48VDC system. It's suggested to connect at least 200Ah capacity battery.

**NOTE:** Please only use sealed lead acid battery or sealed GEL/AGM lead-acid battery.

3. Insert the ring terminal of battery cable flatly into battery connector on the inverter and make sure the bolts are tightened to a torque of 2-3 Nm. Make sure polarity at both the battery and the inverter/charge is correctly connected and ring terminals are tightly screwed to the battery terminals.



| | |
|---|---|
| ⚠ | **WARNING: Shock Hazard**<br>Installation must be performed with care due to high battery voltage in series. |

| | |
|---|---|
| ⚠ | **CAUTION!!** Do not place anything between the flat part of the inverter terminal and the ring terminal. Otherwise, overheating may occur.<br>**CAUTION!!** Do not apply anti-oxidant substance on the terminals before terminals are connected tightly.<br>**CAUTION!!** Before making the final DC connection or closing DC breaker/disconnector, be sure positive (+) must be connected to positive (+) and negative (-) must be connected to negative (-). |

## AC Input/Output Connection

**CAUTION!!** Before connecting to AC input power source, please install a **separate** AC breaker between inverter and AC input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of AC input. The recommended spec of AC breaker is 40A for 4KVA and 50A for 5KVA.

**CAUTION!!** There are two terminal blocks with "IN" and "OUT" markings. Please do NOT mis-connect input and output connectors.

**WARNING!** All wiring must be performed by a qualified personnel.

**WARNING!** It's very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable size as below.

**Suggested cable requirement for AC wires**

| Model | AWG no. | Torque |
|---|---|---|
| 4KVA | 10 AWG | 1.4~1.6Nm |
| 5KVA | 8 AWG | 1.4~1.6Nm |

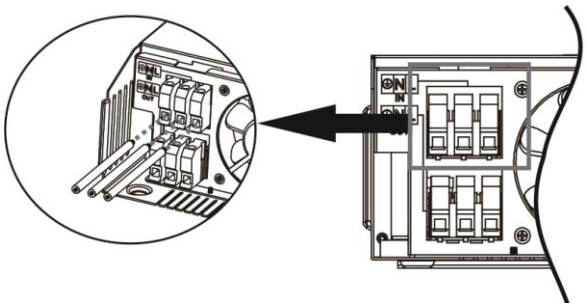
Please follow below steps to implement AC input/output connection:

1. Before making AC input/output connection, be sure to open DC protector or disconnector first.
2. Remove insulation sleeve 10mm for six conductors. And shorten phase L and neutral conductor N 3 mm.
3. Insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws. Be sure to connect PE protective conductor (⏚) first.

   **L→LINE (brown or black)**

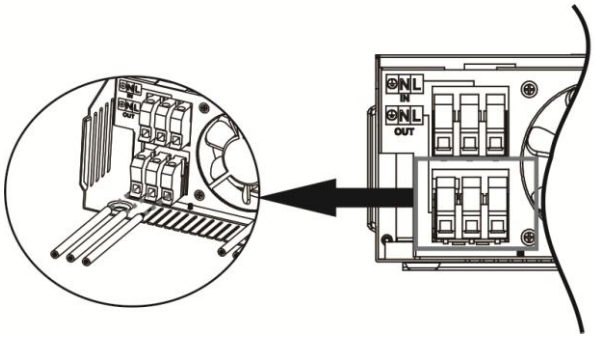
   ⏚**→Ground (yellow-green)**

   **N→Neutral (blue)**



| | |
|---|---|
| ⚠ | **WARNING:**<br>Be sure that AC power source is disconnected before attempting to hardwire it to the unit. |

4. Then, insert AC output wires according to polarities indicated on terminal block and tighten terminal screws. Be sure to connect PE protective conductor (⏚) first.
   **L→LINE (brown or black)**
   ⏚**→Ground (yellow-green)**
   **N→Neutral (blue)**



5. Make sure the wires are securely connected.

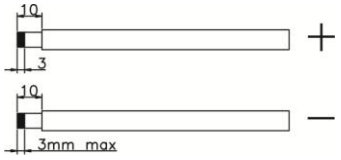
## PV Connection (Only apply for the model with solar charger)

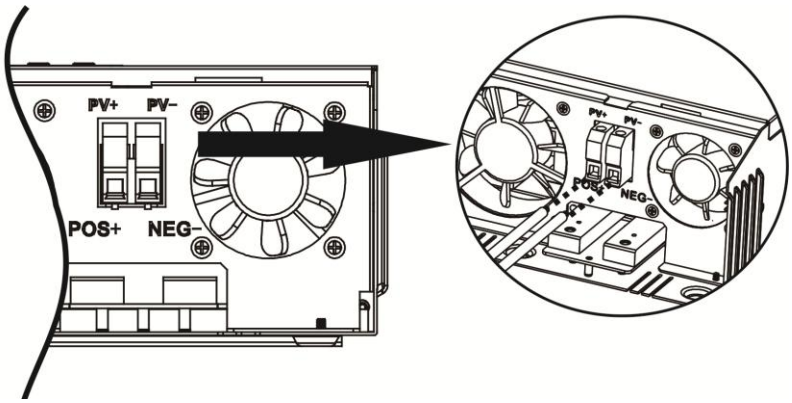
**CAUTION:** Before connecting to PV modules, please install **separately** a DC circuit breaker between inverter and PV modules.

**WARNING!** All wiring must be performed by a qualified personnel.
**WARNING!** It's very important for system safety and efficient operation to use appropriate cable for PV module connection. To reduce risk of injury, please use the proper recommended cable size as below.

| Model | Typical Amperage | Cable Size | Torque |
|---|---|---|---|
| 4KVA/5KVA | 50A | 8 AWG | 1.4~1.6 Nm |

Please follow below steps to implement PV module connection:
1. Remove insulation sleeve 10 mm for positive and negative conductors.
2. Check correct polarity of connection cable from PV modules and PV input connectors. Then, connect positive pole (+) of connection cable to positive pole (+) of PV input connector. Connect negative pole (-) of connection cable to negative pole (-) of PV input connector.

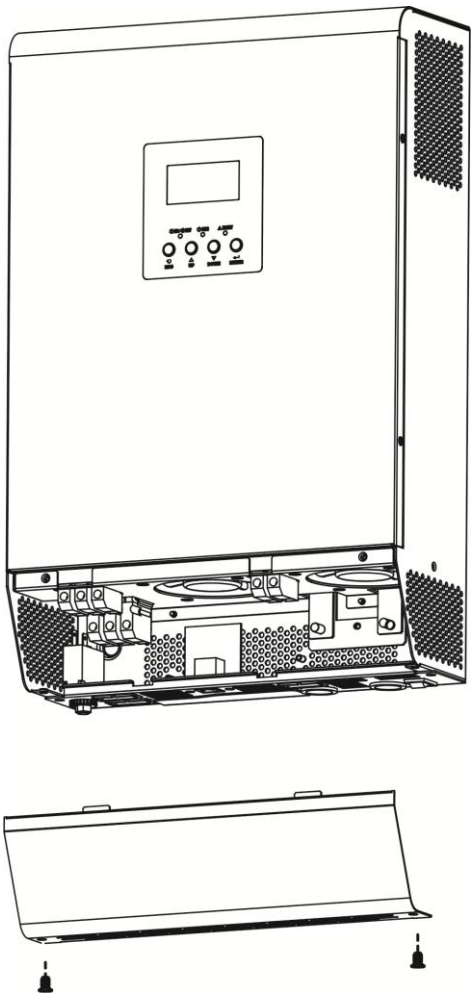





3. Make sure the wires are securely connected.

## Final Assembly

After connecting all wirings, please put bottom cover back by screwing two screws as shown below.

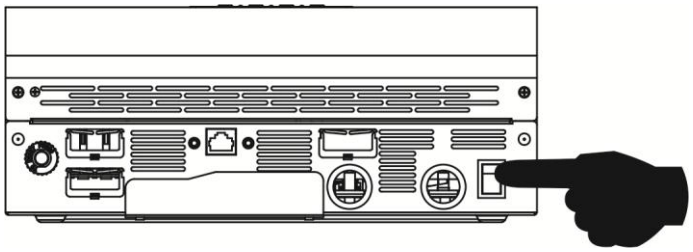


## Communication Connection

This inverter/charger is equipped with a communication port to communicate with a PC with corresponding software. Please use supplied communication cable to connect to RS-232 of this inverter and RS-232 port of the PC. Please access software download site to download the monitoring software in your PC. Software download website: www.power-software-download.com/watchpower.html. For the detailed software operation, please check user manual of software.

# OPERATION

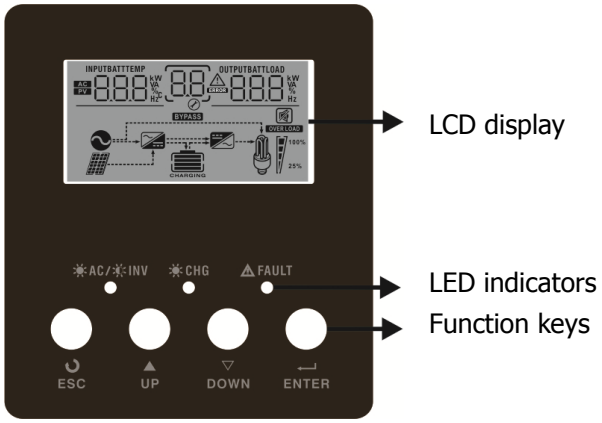
## Power ON/OFF



Once the unit has been properly installed and the batteries are connected well, simply press On/Off switch (located on the button of the case) to turn on the unit.

## Operation and Display Panel

The operation and display panel, shown in below chart, is on the front panel of the inverter. It includes three indicators, four function keys and a LCD display, indicating the operating status and input/output power information.



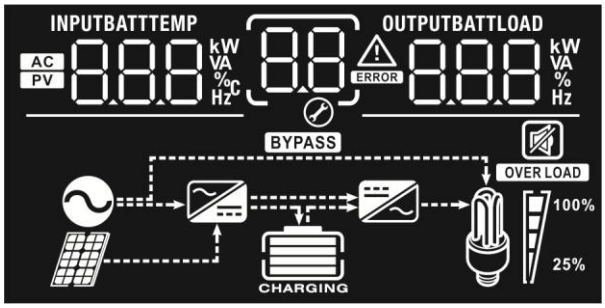

**LED Indicator**

| LED Indicator | | | Messages |
|---|---|---|---|
| AC / INV | Green | Solid On | Output is available in bypass mode |
| | | Flashing | Output is powered by battery in inverter mode |
| CHG | Green | Solid On | Battery is fully charged |
| | | Flashing | Battery is charging. |
| ⚠ FAULT | Red | Solid On | Fault mode |
| | | Flashing | Warning mode |

**Function Keys**

| Function Key | Description |
|---|---|
| ESC | Exit setting mode |
| UP | To previous selection |
| DOWN | To next selection |
| ENTER | To confirm the selection in setting mode or enter setting mode |

# LCD Display Icons



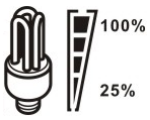

| Icon | Function description |
|---|---|
| **Input Source Information** | |
| AC | Indicates the AC input. |
| PV | Indicates the PV input |
| INPUTBATT 888 kW VA %°C Hz | Indicate input voltage, input frequency, PV voltage, battery voltage and charger current. |
| **Configuration Program and Fault Information** | |
| 88 | Indicates the setting programs. |
| 88 ERROR | Indicates the warning and fault codes.<br>Warning: 88 flashing with warning code.<br>Fault: 88 ERROR lighting with fault code |
| **Output Information** | |
| OUTPUTBATTLOAD 888 kW VA % Hz | Indicate output voltage, output frequency, load percent, load in VA and load in Watt. |
| **Battery Information** | |
| CHARGING | Indicates battery level by 0-24%, 25-49%, 50-74% and 75-100% in battery mode and charging status in line mode. |

In AC mode, it will present battery charging status.

| Status | Battery voltage | LCD Display |
|---|---|---|
| Constant Current mode / Constant Voltage mode | <2V/cell | 4 bars will flash in turns. |
| | 2 ~ 2.083V/cell | Bottom bar will be on and the other three bars will flash in turns. |
| | 2.083 ~ 2.167V/cell | Bottom two bars will be on and the other two bars will flash in turns. |
| | > 2.167 V/cell | Bottom three bars will be on and the top bar will flash. |
| Floating mode. Batteries are fully charged. | | 4 bars will be on. |

In battery mode, it will present battery capacity.

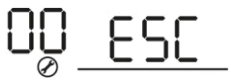
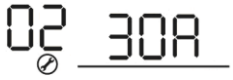
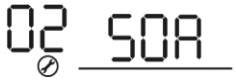
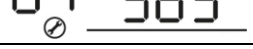
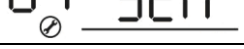
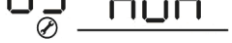
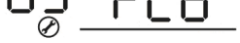
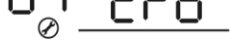
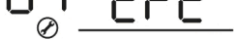
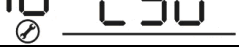
| Load Percentage | Battery Voltage | LCD Display |
|---|---|---|
| Load >50% | < 1.717V/cell | |
| | 1.717V/cell ~ 1.8V/cell | |
| | 1.8 ~ 1.883V/cell | |
| | > 1.883 V/cell | |
| 50%> Load > 20% | < 1.817V/cell | |
| | 1.817V/cell ~ 1.9V/cell | |
| | 1.9 ~ 1.983V/cell | |
| | > 1.983 | |
| Load < 20% | < 1.867V/cell | |
| | 1.867V/cell ~ 1.95V/cell | |
| | 1.95 ~ 2.033V/cell | |
| | > 2.033 | |

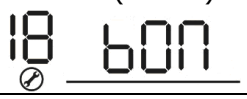
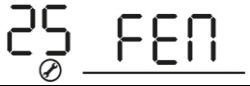
| **Load Information** | | | | |
|---|---|---|---|---|
| OVER LOAD | Indicates overload. | | | |
|   | Indicates the load level by 0-24%, 25-50%, 50-74% and 75-100%. | | | |
| | 0%~25% | 25%~50% | 50%~75% | 75%~100% |
| | | | | |
| **Mode Operation Information** | | | | |
| | Indicates unit connects to the mains. | | | |
| | Indicates unit connects to the PV panel. | | | |
| BYPASS | Indicates load is supplied by utility power. | | | |
| | Indicates the utility charger circuit is working. | | | |
| | Indicates the DC/AC inverter circuit is working. | | | |
| **Mute Operation** | | | | |
| | Indicates unit alarm is disabled. | | | |

# LCD Setting

After pressing and holding ENTER button for 3 seconds, the unit will enter setting mode. Press "UP" or "DOWN" button to select setting programs. And then, press "ENTER" button to confirm the selection or ESC button to exit.

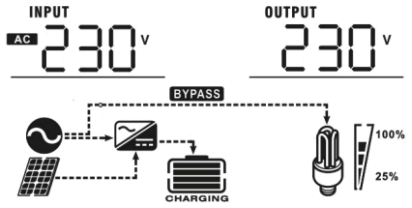
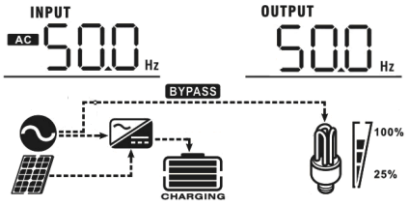
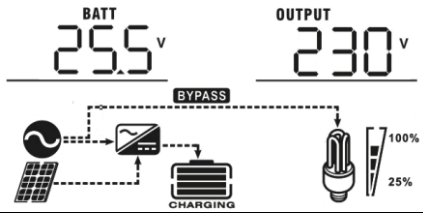
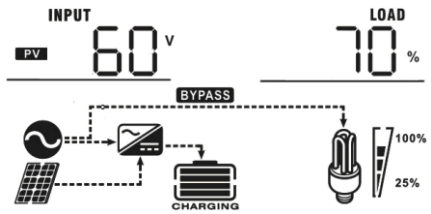
**Setting Programs:**

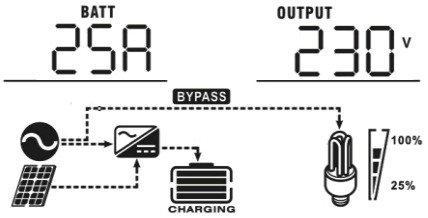
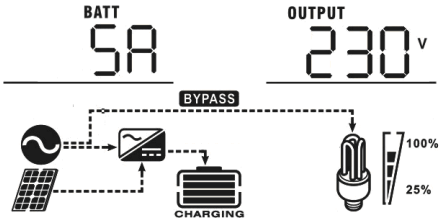
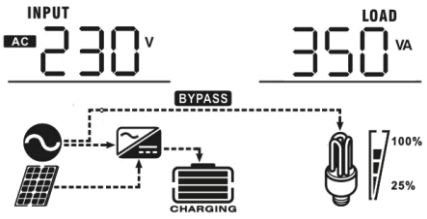
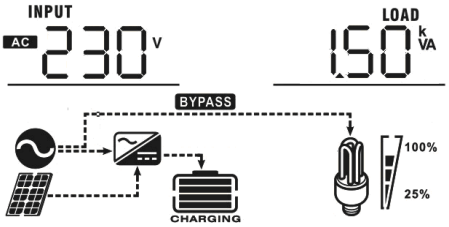
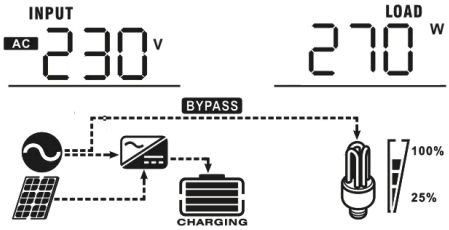
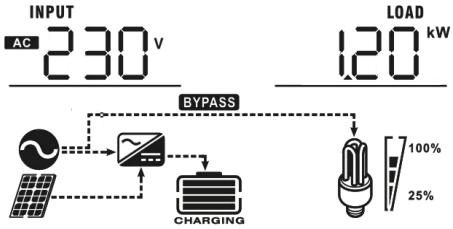
| Program | Description | Selectable option | |
|---|---|---|---|
| 00 | Exit setting mode | Escape  | |
| 01 | Output source priority | Solar first: | Utility first (default): |
| 02 | Maximum charging current | 10A: | 20A: |
| | | 30A:  | 40A: |
| | | 50A (default):  | |
| 03 | AC input voltage range | Appliances(default): | UPS: |
| 04 | Power saving mode | Saving disable(default):  | Saving mode enable:  |
| 05 | Battery type | AGM(default):  | Flooded:  |
| 06 | Auto restart when overload occurs | Restart disable(default): | Restart enable: |
| 07 | Auto restart when over temperature occurs | Restart disable(default):  | Restart enable:  |
| 09 | Output frequency | 50Hz(default): | 60Hz: |
| 16 | Charger source priority | Solar first:  | Utility first: |
| | | Solar and Utility(default): | |

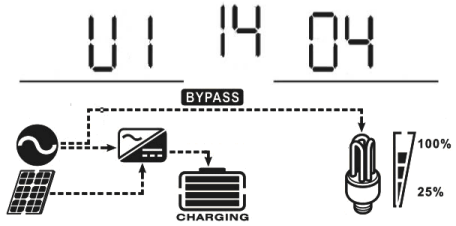
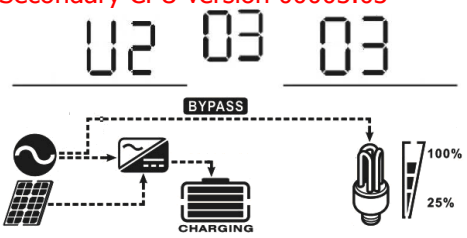
| | | | |
|---|---|---|---|
| 18 | Alarm control | Alarm on(default):  | Alarm off: |
| 20 | Backlight control | Backlight on(default): | Backlight off: |
| 22 | Beeps while primary source is interrupted | Alarm on(default): | Alarm off: |
| 25 | Record Fault code | Record enable:  | Record disable(default): |

## Display Setting

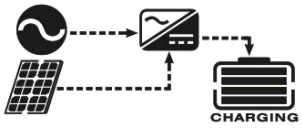
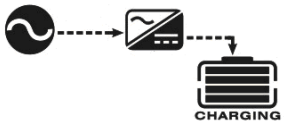
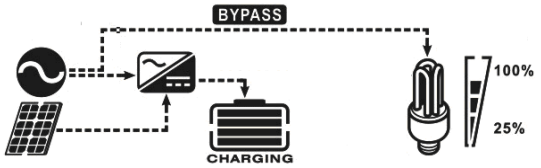
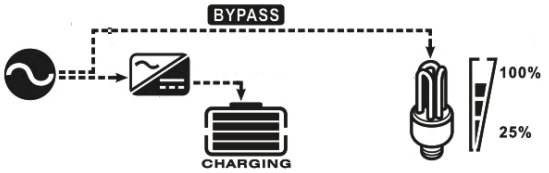
The LCD display information will be switched in turns by pressing "UP" or "DOWN" key. The selectable information is switched as below order: input voltage, input frequency, battery voltage, charging current, PV voltage, output voltage, output frequency, load percentage, load in Watt, load in VA, CPU1 Version and CPU2 Version

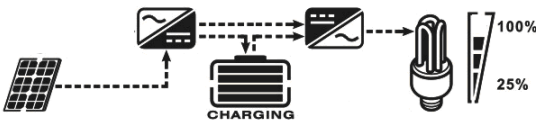
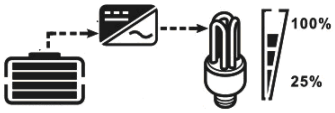
| Selectable information | LCD display |
|---|---|
| Input voltage/Output voltage (Default) | Input Voltage=230V, output voltage=230V  |
| Input frequency/Output frequency | Input frequency=50Hz, Output frequency=50Hz  |
| Battery voltage/Output voltage | Battery voltage=25.5V  |
| PV voltage/Load percentage | PV voltage=60V, Load percent=70%  |

| | |
|---|---|
| Charging current/Output voltage | Current ≧ 10A<br>  <br><br>Current < 10A<br>  <br> |
| Input voltage/Load in VA | When load is lower than 1kVA, load in VA will presents 350V as below.<br>  <br><br>When load is larger than 1kVA (≧1KVA), load in VA will presents 1.5kVA as below:<br>  <br> |
| Input voltage/Load in Watt | When load is lower than 1kW, load in W will present 270W as below:<br>  <br><br>When load is larger than 1kW (≧1KW), load in W will present 1.2kW as below.<br>  <br> |

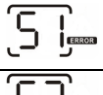
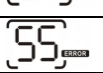
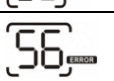
| | |
|---|---|
| Main CPU version checking | Main CPU version 00014.04<br>  |
| Secondary CPU version checking | Secondary CPU version 00003.03<br>  |

## Operating Mode Description

| Operation mode | Description | LCD display |
|---|---|---|
| Standby mode/ Fault mode/ Power saving mode | No output is supplied by the unit but it still can charge batteries. | Charging by utility and PV<br>  |
| | | Charging by utility<br>  |
| | | Charging by PV<br> |
| | | No charging<br> |
| Line Mode | The unit will provide output power from the mains. It will also charge the battery at line mode. | Charging by utility and PV<br>  |
| | | Charging by utility<br>  |

| | | |
|---|---|---|
| Battery Mode | The unit will provide output power from battery and PV power. | Power from battery and PV power.<br>  |
| | | Power from battery only.<br>  |

## Fault Reference Code

| Fault Code | Fault Event | Icon on |
|---|---|---|
| 01 | Fan is locked | |
| 02 | Over temperature | |
| 03 | Battery voltage is too high | |
| 04 | Battery voltage is too low | |
| 05 | Output short circuited or Over temperature | |
| 06 | Output voltage is too high | |
| 07 | Over load time out | |
| 08 | Bus voltage is too high | |
| 09 | Bus soft start failed | |
| 11 | Main relay failed | |
| 51 | Over current inverter | |
| 52 | Bus voltage is too low |  |
| 53 | Inverter soft start failed | |
| 54 | Self-test failed | |
| 55 | Over DC voltage on output of inverter | |
| 56 | Battery connection is open |  |
| 57 | Current sensor failed |  |
| 58 | Output voltage is too low | |

# Warning Indicator

| Warning Code | Warning Event | Audible Alarm | Icon flashing |
|---|---|---|---|
| 01 | Fan is locked | Beep three times every second | |
| 03 | Battery is over charged | Beep once every 1second | |
| 04 | Low battery | Beep once every 1 second | |
| 07 | Overload | Beep once every 0.5 second | |
| 10 | Power limitation | Beep twice every 3 seconds | |

# SPECIFICATIONS

Table 1 Line Mode Specifications

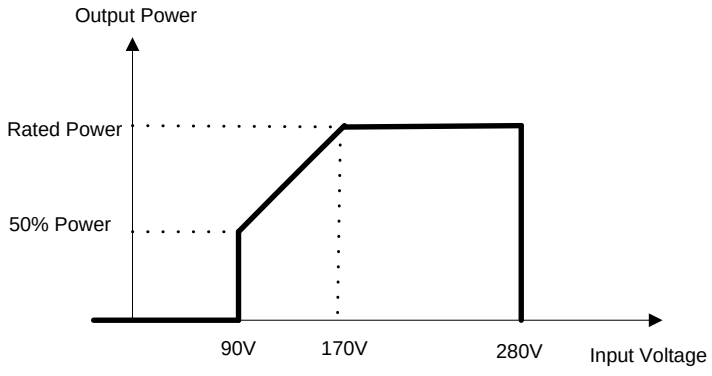
| INVERTER MODEL | 4KVA | 5KVA |
|---|---|---|
| **Input Voltage Waveform** | Sinusoidal (utility or generator) | |
| **Nominal Input Voltage** | 230Vac | |
| **Low Loss Voltage** | 170Vac±7V (UPS);<br>90Vac±7V (Appliances) | |
| **Low Loss Return Voltage** | 180Vac±7V (UPS);<br>100Vac±7V (Appliances) | |
| **High Loss Voltage** | 280Vac±7V | |
| **High Loss Return Voltage** | 270Vac±7V | |
| **Max AC Input Voltage** | 300Vac | |
| **Nominal Input Frequency** | 50Hz / 60Hz (Auto detection) | |
| **Low Loss Frequency** | 40±1Hz | |
| **Low Loss Return Frequency** | 42±1Hz | |
| **High Loss Frequency** | 65±1Hz | |
| **High Loss Return Frequency** | 63±1Hz | |
| **Output Short Circuit Protection** | Circuit Breaker | |
| **Efficiency (Line Mode)** | >95% ( Rated R load, battery full charged ) | |
| **Transfer Time** | 10ms typical (UPS);<br>20ms typical (Appliances) | |
| **Power Limitation** |  | |

Table 2 Invert Mode Specifications

| INVERTER MODEL | 4KVA | 5KVA |
|---|---|---|
| **Rated Output Power** | 4KVA/3.2KW | 5KVA/4KW |
| **Output Voltage Waveform** | Pure Sine Wave | |
| **Output Voltage Regulation** | 230Vac±5% | |
| **Output Frequency** | 50Hz | |
| **Peak Efficiency** | 90% | |
| **Overload Protection** | 5s@≥150% load; 10s@110%~150% load | |
| **Surge Capacity** | 2* rated power for 5 seconds | |
| **Nominal DC Input Voltage** | 48Vdc | |
| **Cold Start Voltage** | 46.0Vdc | |
| **Low DC Warning Voltage**<br>@ load < 20%<br>@ 20% ≤ load < 50%<br>@ load ≥ 50% | <br>44.0Vdc<br>42.8Vdc<br>40.4Vdc | |
| **Low DC Warning Return Voltage**<br>@ load < 20%<br>@ 20% ≤ load < 50%<br>@ load ≥ 50% | <br>46.0Vdc<br>44.8Vdc<br>42.4Vdc | |
| **Low DC Cut-off Voltage**<br>@ load < 20%<br>@ 20% ≤ load < 50%<br>@ load ≥ 50% | <br>41.0Vdc<br>40.8Vdc<br>38.4Vdc | |
| **High DC Recovery Voltage** | 54Vdc | |
| **High DC Cut-off Voltage** | 56Vdc | |
| **No Load Power Consumption** | <50W | |
| **Saving Mode Power Consumption** | <15W | |

Table 3 Charge Mode Specifications

| INVERTER MODEL | 4/5KVA |
|---|---|
| **Charging Algorithm** | 2-Step |
| **Utility Charging Mode** | |
| **Charging Current (UPS)** | 20/30Amp |
| **Charging Floating Voltage** | 54Vdc |
| **Solar Charging Mode** | |
| **Charging Current (PWM)** | 50Amp |
| **System DC Voltage** | 48Vdc |
| **Max. PV Array Open Circuit Voltage** | 125Vdc |
| **Standby Power Consumption** | 2W |
| **DC Voltage Accuracy** | +/-0.3% |

Table 4 General Specifications

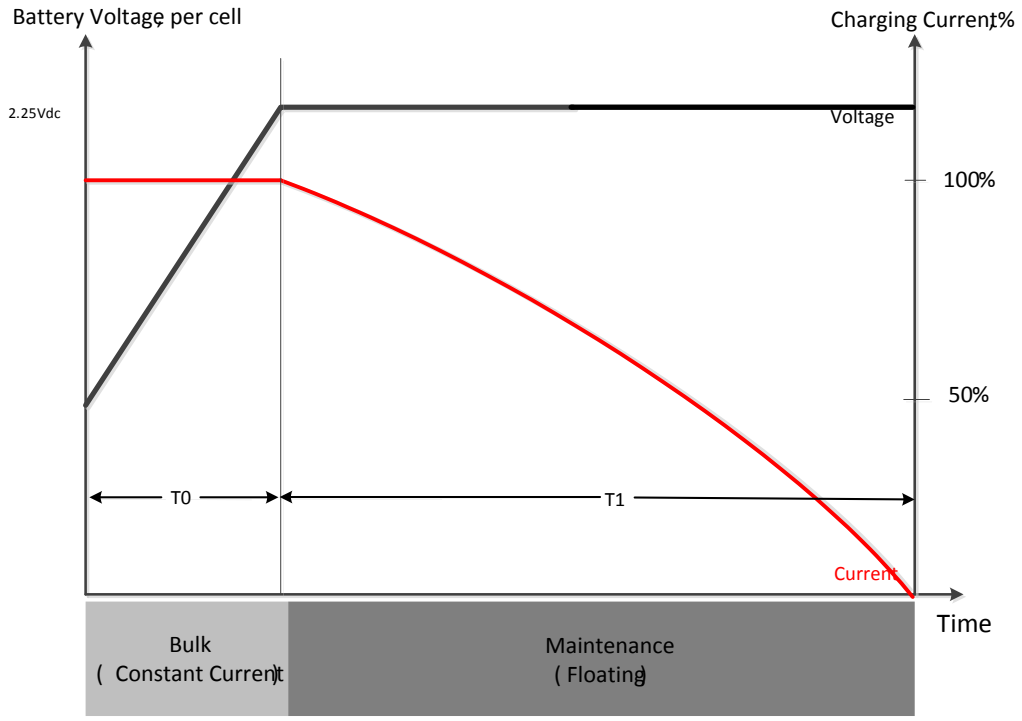
| INVERTER MODEL | 4KVA/5KVA |
|---|---|
| **Safety Certification** | CE |
| **Operating Temperature Range** | 0°C to 55°C |
| **Storage temperature** | -15°C~ 60°C |
| **Dimension (D*W*H), mm** | 468 * 295 * 120 |
| **Net Weight, kg** | 10 |

## Charging Controls

Voltage Setting

| Battery Type | Float |
|---|---|
| Flooded/ AGM / Gel | 48 |
| | 54 |

Charging Curve



# TROUBLE SHOOTING

| Problem | LCD/LED/Buzzer | Explanation / Possible cause | What to do |
|---|---|---|---|
| Unit shuts down automatically during startup process. | LCD/LEDs and buzzer will be active for 3 seconds and then complete off. | The battery voltage is too low (<1.91V/Cell) | 1. Re-charge battery.<br>2. Replace battery. |
| No response after power on. | No indication. | 1. The battery voltage is far too low. (<1.4V/Cell)<br>2. Battery polarity is connected reversed. | 1. Check if batteries and the wiring are connected well.<br>2. Re-charge battery.<br>3. Replace battery. |
| Mains exist but the unit works in battery mode. | Input voltage is displayed as 0 on the LCD and green LED is flashing. | Input protector is tripped | Check if AC breaker is tripped and AC wiring is connected well. |
| | Green LED is flashing. | Insufficient quality of AC power (Shore or Generator) | 1. Check if AC wires are too thin and/or too long.<br>2. Check if generator (if applied) is working well, or check if input voltage range setting is correct (UPS→Appliance) |
| | Green LED is flashing. | Set Solar power as the priority of output source | Change output source priority to Utility first. |
| When the unit is turned on, internal relay is switched on and off repeatedly. | LCD display and LEDs are flashing. | Battery is disconnected. | Check if battery wires are connected well. |
| Buzzer beeps continuously and red LED is on. | Fault code 07. | Overload error. The inverter is loaded with more than 110% load and time is up | Reduce the connected load by switching off some equipment. |
| | Fault code 05. | Output short circuited. | Check if wiring is connected well and remove abnormal load. |
| | | Temperature of internal converter component is over 120°C. | Check whether the air flow of the unit is blocked or whether the ambient temperature is too high. |
| | Fault code 02. | Internal Inverter component over 100°C | |
| | Fault code 03. | Battery is over charged. | Return to repair center. |
| | | The battery voltage is too high. | Check if spec and quantity of batteries are meet requirements. |
| | Fault code 01. | Fan fault | Replace the fan. |
| | Fault code 06. | Output abnormal (Inverter voltage below than 190Vac or is higher than 260Vac) | 1. Reduce the connected load.<br>2. Return to repair center |
| | Fault code 08. | Internal components failed. | Return to repair center |
| | Fault code 09. | | |

# Appendix: Approximate Back-up Time Table

| Model | Load (VA) | Backup Time @ 12Vdc 100Ah (min) | Backup Time @ 12Vdc 200Ah (min) |
|---|---|---|---|
| 4KVA | 400 | 766 | 1610 |
| | 800 | 335 | 766 |
| | 1200 | 198 | 503 |
| | 1600 | 139 | 339 |
| | 2000 | 112 | 269 |
| | 2400 | 95 | 227 |
| | 2800 | 81 | 176 |
| | 3200 | 62 | 140 |
| | 3600 | 55 | 125 |
| | 4000 | 50 | 112 |

| Model | Load (VA) | Backup Time @ 12Vdc 100Ah (min) | Backup Time @ 12Vdc 200Ah (min) |
|---|---|---|---|
| 5KVA | 500 | 613 | 1288 |
| | 1000 | 268 | 613 |
| | 1500 | 158 | 402 |
| | 2000 | 111 | 271 |
| | 2500 | 90 | 215 |
| | 3000 | 76 | 182 |
| | 3500 | 65 | 141 |
| | 4000 | 50 | 112 |
| | 4500 | 44 | 100 |
| | 5000 | 40 | 90 |

**Note:** Backup time depends on the quality of the battery, age of battery and type of battery.
Specifications of batteries may vary depending on different manufacturers.